Diversity and Inclusion Professional Societies Case Study

AUTHORS

Michelle Henderson³, Maya Carrasquillo³, Lindsay Birt⁵, Aliza Furneaux⁴, Lou Storino², Nancy Dunn⁵, Ifetayo Venner¹, Maya Trotz³

1-Arcadis, 2- Metropolitan Water Reclamation District of Greater Chicago, 3- University of South Florida, 4- WateReuse Association, 5- Xylem

ABSTRACT

Building a diverse workforce is a challenge that is mutually experienced across sectors, yet each sector also has successes to share in efforts towards a more diverse and inclusive workforce. This interactive session will highlight case studies across sectors including industry, municipal, academia and professional societies (WEF) and the impacts of various programs on their local communities and provide insights on moving the industry's diversity and inclusion forward as a whole. Panelists will present case studies and experiences highlighting challenges and opportunities to strengthen the pipeline of leaders in the water industry and recruitment and retention strategies to attract a diverse workforce. Panelists will each give a brief presentation, followed by an interactive panel discussion facilitated by the moderator. Participants across sectors, can glean from the various perspectives and experiences of utility leaders, academic professors, professional societies, and students.

KEYWORDS

Diversity and Inclusion, Workforce Development, Case-studies,

INTRODUCTION

Throughout the unprecedented global pandemic, the water workforce has served communities ensuring public health remained a top priority. As the water sector and its workforce grapples with the continuing public health and economic fallout, the need to foster a new generation of a more diverse and resilient workforce has never been more paramount.

The continued displays of police brutality and systematic oppression of people of color, provides important context for the discussion on developing a diverse and inclusive water workforce. In a 2016 study by the Brookings Institute, the water workforce was found to be 85% male and two-thirds white of an older age group (Brookings Institute, 2016). Just as any other industry, it is imperative the water workforce reflects the diversity of the communities it serves.

With these unprecedented challenges in mind, the unique opportunities the water workforce provides can be discussed. The water sector provides durable careers with equitable wages at low education requirements that can be found across the country in rural and urban communities (Brookings Institute, 2016). Additionally, the sector is poised for large infrastructure investments needed to upgrade and maintain water systems on the order of \$655 billion (Brookings Institute,

2016), and additional investment from COVID stimulus relief. The National Association of Clean Water Administrators estimates pandemic related assistance in the order of \$15.5 billion for drinking water and \$12.5 to \$16.8 billion for wastewater will be needed.

Currently, barriers to growing the workforce include an aging workforce, lack of public awareness about career and technical education programs that would provide entry into the water industry, inflexibility in hiring procedures, lack of training programs, and educational and licensing requirements vary widely between states. To diversify the workforce will mean developing a workforce that represents the "undeniable presence of difference" in gender and gender identity, race and ethnicity, geographical background, and ability (The Diversity Gap, 2019). Essential to the longevity and continued success of a diverse workforce is the inclusivity and equity provided within the sector.

This session highlights four diversity and inclusion (D&I) efforts aimed at fostering a diverse water workforce where all people feel they belong, can participate, and have the tools they need to thrive. These efforts represent different areas of the sector (academia, professional organizations, industry, and municipal) and the different stages of developing a workforce. The University of South Florida (USF) shares the re-thinking required in the way we educate and train the workforce in academic settings. The Water Environment Federation (WEF) shares how professional organizations retain interested students and then engage newly graduated students in a water career. Xylem, Inc. and Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) demonstrate efforts not only to recruit diverse talent but develop work environments conducive to success at every level of a career.

The efforts have been developed as case-studies highlighting each area's unique strategy to address D&I within the water sector. Xylem Inc. established clear D&I metrics and a structured leadership program with the goal of creating an organization in which all employees feel involved, respected, valued, connected and bring their authentic self to work. The MWRDGC takes a multifaceted approach to addressing D&I initiatives in staffing, community engagement, contract opportunities and relationship building. Professional Groups, like WEF, established a process for effective review and facilitation of strategy development to engage the future workforce. USF demonstrates the importance of educating our future engineers and thinkers on complex problem solving and intersectionality.

CASE STUDY 1: ACADEMIC

Introduction

For today's population one ninth are undernourished (FAO et al. 2015), and 40% live within 100 km of a coastline (UN, 2017). Sustainable solutions are needed to improve nutrition from land and aquatic based agriculture while reducing global greenhouse gas (GHG) emissions, freshwater withdrawals, the flux of nutrients like to coastal zones (Howarth 2008; Woodland et al. 2015), and harmful algal blooms (Heisler et al. 2008; Howarth et al. 2011) that disrupt coral reef and marine food systems (Doney et al. 2012; Giakoumi et al. 2014; Halpern et al. 2007). If university graduates are to make an impact on the many food, energy, and water systems (FEWS) challenges that require emerging technologies and interconnections across disciplines and international boundaries, their training must develop 21st century interdisciplinary skills and global competencies that emphasize systems thinking (NIH 2006; Brown et al. 2010; NSF 2011, 2014). With training in systems thinking and participation in interdisciplinary and diverse research, underrepresented minority students can be retained for careers in academia.

Approach

Strong Coasts aims to develop a transformative community-engaged and interdisciplinary training and research program for Science Technology Engineering and Mathematics (STEM) graduate students who will innovate solutions to sustainably manage complex and interconnected coastal social, economic, and environmental systems. It is supported by a \$3 million USD National Science Foundation Collaborative National Research Traineeship (NRT) award (#1735320) led by the University of South Florida (USF) and the University of the Virgin Islands (UVI), a Historically Black College and University. The central research question is: what are the leverage points (technological, regulatory, organizational) in food-energy-water systems in a specific geographic context to improve the sustainability of the overall system across different scales? PhD-level trainees from engineering and applied anthropology at USF and MS-level trainees from marine and environmental sciences from the UVI answer that question mainly in four locations with high Black and Brown populations: Tampa, Florida, the U.S. Virgin Islands, Barbados and Belize. With the exception of Tampa, the other locations offer limited or no university level engineering programs. This project is co-funded by the Louis Stokes Alliances for Minority Participation (LSAMP).

Since January 2019 this NRT has enrolled 12 fellows, 8 women and 6 underrepresented minorities, who take a suite of three new systems based interdisciplinary courses, including an international field course, conduct community engaged systems based research, and build professional skills on science communication and science policy.

Challenges

Challenges faced include category 5 hurricanes Maria and Irma that significantly impacted livelihoods and destroyed the research space of colleagues at the UVI in 2017. Being agile with the program, and reassigning budget to support USF researchers in the USVI who can contribute to building FEWS resiliency there, help to maintain collaborations. Finding financial support to provide fellows longer term research experiences with partner communities, some of which are international, is a major challenge especially since many US grants provide little support for non-US partners.

Highlights

Partnering with utilities and regional organizations in the Caribbean have opened new avenues for grants on larger scale projects that support collaboration, sometimes with funding even, for Strong Coasts researchers. Building these relationships to work on such grants takes time, and while the fellows help to strengthen the partnerships, mechanisms must be put in place to ensure they are sustained once they graduate. Interdisciplinary work requires common terminologies, and new tools for defining challenges, and contributing solutions to addressing them. Engineers partner with anthropologists to build competencies with working with communities, and some have introduced environmental, social, and climate justice into their research, and curriculum. According to PhD candidate Michelle Henderson, "We are no longer siloed into our disciplines, but instead take an integrated approach to solving issues," and PhD candidate Maya Carrasquillo, "we are producing well rounded anthropological engineers and technical anthropologists who have the ability to tackle 21st century sustainability, equity and justice challenges head on!" (Strong Coasts, 2019). Fellows have driven conversations on intersectionality (e.g. being a person of color and a woman) and positionality (e.g. being a graduate student in a foreign community), and addressed these in their own research. Fostering a learning environment that supports this exploration and reflection seems even more critical at this time as issues emerge in the US linking systemic racism to built infrastructure, and the subsequent inequitable impacts on human health and wealth.

CASE STUDY 2: PROFESSIONAL GROUPS (WEF InFLOW)

Introduction

The Water Environment Federation's Strategic Plan has two Strategic Goals related to increasing the diversity of the water workforce:

- Strategic Goal 1a: Increase diversity and inclusiveness in the water sector through engagement and membership growth
- Strategic Goal 4d: Promote sector-wide action toward development of a water workforce that is diverse and prepared to meet the future needs of the water sector.

At WEFTEC 2018, the WEF established WEF InFLOW - InFLOW stands for INtroducing Future Leaders to Opportunities in Water - as pilot to introduce students from underrepresented racial and ethnic minority groups to the water sector. Research has shown that the water sector is not diverse in terms of gender (85% male) or Black and Asian workers overall (11.8% compared to 18% in the US population) (Kane and Tomer (Brookings Institute), 2018). Black and Hispanic workers are underrepresented in higher paying jobs that typically require education beyond the high school level such as engineering and management.

Approach

With the generous support of sponsors, 16 Black students (Sophomore to PhD Level, 8 male and 8 female students) from three (3) universities (Howard University, Tuskegee University, University of South Florida) were immersed in WEFTEC 2018 activities from Friday to Tuesday in an effort to expose them to the many aspects of the water sector and to provide multiple opportunities to network with WEFTEC attendees. The ultimate goal of the program was to introduce the students to the water sector, solidify their interest in working in water, and to increase their probabilities for employment and long-term success working in water.

The students were given a packed and structured schedule, engaging with already existing activities, with the exception of a panel of several minority leaders in the sector who represented the utility, academic, consulting, and manufacturer segments of the sector, and a graduation lunch that provided an opportunity for the students to interact with water sector leaders and emerging professionals from sponsors and utilities. The program was as follows:

Friday - Water Palooza (S&YP)

Saturday - Service Project (S&YP), Jammin'4Water

Sunday - Free Sunday Morning, Student Design Competition (S&YP), Water Leaders Panel (S&YP)

Monday - Opening General Session, Student Chapter Meeting (S&YP), Student and Young Professional's Committee Meeting (S&YP), Career Fair

Tuesday - Technical Sessions/Exhibit Floor, "Graduation" Lunch

(S&YP indicates an existing Students and Young Professional's committee activity)

Highlights

The inaugural InFLOW was very successful, with both the program and the students gaining much visibility and positive feedback. The students generally commented that while the program was very hectic and at times overwhelming, they were surprised and amazed by the opportunities in the sector and how welcoming the conference goers were. Many of the students had not been exposed to water in their undergraduate training or other engagement and had not realized these careers were possible. Others commented that water careers aligned more with their interests as it related to sustainability and the environment than the careers they were aware of for Civil Engineers via their school. Specific feedback from polling post WEFTEC indicated their top ranked activities were the following:

- 1. Networking Panel
- 2. Career Fair
- 3. Luncheon
- 4. SYP Service Project & WaterPalooza
- 5. Students & Young Professionals Committee Meeting

It also indicated while there was already quite a bit of opportunities in the packed schedule to learn about the sector and to network, the students wished there could have had more of these opportunities:

- 1. More networking with Students & YPs
- 2. More networking with water industry professionals
- 3. More information about the water industry

In 2019, the InFLOW program was formalized and expanded. InFLOW is now comprised of two tracks:

- 1. STEMPath identifies scholars enrolled in undergraduate/graduate degree programs from historically underrepresented ethnic and racial groups. This track was similar to the 2018 pilot, but was expanded to include 26 Black, Hispanic, Native Alaskan and Native Hawaiian students from 6 universities (Howard University, University of South Florida, Florida Agricultural and Mechanical University (FAMU), Florida International University (FIU), University of Hawaii, and University of Alaska Anchorage).
- 2. CareerTech connects with underserved scholars who have experienced barriers to employment such as low socio-economic status or managing a disability. This track expanded on a pilot program at WEFTEC 2018 called Emerging Water Quality Scholars and is more focused on careers in operations and maintenance. At WEFTEC 2019, WEF partnered with the Corp Network to engage with 16 scholars from the local Chicago area to introduce them to careers in water.

Although STEMPath and CareerTech were two separate tracks, both groups participated in some of the same events such as a Sunday tour of a Water Resource Recovery Facility (WRRF), the Service Project, and a Graduation Lunch. Each track had a separate Water Leaders Panel, and the CareerTech scholars attended the Operations Challenge and spent more time on the Exhibit Floor.

Although only two years in, with many students still to graduate, several students from the program have obtained internships and full-time employment in the sector at consulting firms, regulatory agencies, utilities and WEF. The program's success has also led to better engagement with students at the participating universities, in particular at Howard University. Both WEF and the Chesapeake Water Environment Association have engaged with the university, which now has a student chapter (Howard University Water and Environment Association – HUWEA). Both organizations have held Board meetings at Howard and participated in HUWEA activities. Additionally, several WEF Member Associations (MAs) have started an InFLOW program at their MA conference or are looking to do so in the near future.

Challenges

- Balancing the desire to include and impact as many students/scholars and schools as
 possible with providing a good experience that does not compromise the goals or what is
 most successful about the program. More Member Associations establishing an InFLOW
 program for their conferences would allow for more students/scholars and schools to be
 reached for greater impact.
- Establishing and maintaining relationships with new schools or new groups within existing schools, especially at the MA level.
- Many employers have been anxious to employ the students/scholars from the program to address their own workforce and diversity challenges, but it can be challenging for those

- not in the geographic region of the STEMPath schools or the WEFTEC location for CareerTech to do so. More MAs establishing InFLOW programs should help to alleviate this challenge.
- As the program is expanded to MAs, keeping the program true to the mission and intent of the program, while allowing for some flexibility to account for the unique makeup and challenges of their geographic areas and population.
- Keeping engaged with InFLOW alumni to increase likelihood of entry in to the water sector and of long term success in the sector

InFLOW Alumni Perspective

"Last year, I was awarded the opportunity to participate in the WEF Introducing Future Leaders to Opportunity in Water (InFLOW) program for the annual WEFTEC conference. As a participant, I was able to participate in activities towards engaging students as future leaders. From the community participation, career fairs, panels, and other events, I felt that WEF invested in my future. I was thoroughly impressed with the outstanding professionals that I met from the water industry. My participation in this program sparked my interest in learning more about water operation and understanding how to build resiliency in the water industry in the future both physically and socially. I have and will continue to recommend the InFLOW program to my colleagues and future student leaders." - WEF InFLOW alumni 2019.

CASE STUDY 3: INDUSTRY (XYLEM, INC.)

Xylem Fostering Workplace Belonging Through Employee Network Groups

Introduction

Water challenges are escalating around the globe, placing people and communities, our environment, and our very future at risk. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity. Xylem is a Fortune 1000 global water technology provider with one mission: to help our customers solve water through the power of technology and expertise.

Xylem has been embarking on a bold new phase of growth and innovation, as we work to harness our expertise and cutting-edge technologies to help water operators and communities around the world address the growing water challenges they face. We know the best way for us to achieve our aim and serve our stakeholders is to develop a world-class culture that taps into the power of inclusion and diversity. When you bring together people from different backgrounds and cultures, with different talents and experiences, you spark innovation and engagement, and create something truly exceptional. Inclusion and diversity, and the cross-exchange of ideas that they foster, drive innovation.

Approach

Everyday Xylem employees are advancing inclusion and diversity in exciting and impactful ways. In 2018, Xylem established five global D&I goals which we aim to accomplish by 2025, and set internal and external strategy to advance the goals to achieve their Diversity and Inclusion Mission: Create an organization in which all employees feel involved, respected, valued, connected and bring their authentic self to work.

Xylem 2025 Global Diversity & Inclusion Goals:

- Achieve 50% gender parity in leadership roles
- Achieve 25% US minority representation in leadership roles
- Diverse candidate slates for 100% of open people manager roles
- Achieve 25% of employees engaged in employee networks
- Quarterly D&I events that include our customers, suppliers, partners & communities

Internally, Xylem places an emphasis on employee equity and belonging and externally, focuses on diversity hiring and driving D&I thought leadership in the predominately white male sector. One internal strategy that has been particularly impactful in creating a sense of belonging is the Xylem Employee Network Groups. Xylem believes that connecting employees and allies of specific affinity and ensuring they have an opportunity to be heard, valued, and engaged helps all employees feel a sense of equity and belonging at their workplace.

Employee Network groups are a critical piece of Xylem's diversity and inclusion strategy. The groups bring value by building a sense of community and belonging for employees by connecting people in social and professional ways and encouraging interaction between employees. They also empower employees by giving each group a collective voice to speak with decision makers and management including the opportunity to voice concerns as a community. Xylem Employee Networks support learning and development by offering formal and informal leadership opportunities, providing professional and personal development opportunities and creating visibility for employees who are active. Network groups also resource for leadership and decision makers regarding staff/community issues, needs and policies. Finally, Xylem Employee Network groups support retention at Xylem because employees are likely to stay longer if they have built or are part of a strong community within the company and feel heard.

Xylem has six Employee Network Groups that connect and engage employees across the company to exchange ideas, gain valuable skills, and share resources. These internal, self-governed groups enhance professional development, enrich company culture, and support business strategies in the areas of recruitment, retention, community involvement, and customer relationships. Collectively, more than 2,800 employees actively participate as members of our six network groups: Women's, Emerging Leaders, Veterans, LGBT+ and Allies, Working Parents, and People of Color and Allies Networks.

Xylem Employee Network groups aim to help all employees feel a sense of equity and belonging in the workplace and align with business objectives and engage/leverage networks for meaningful change. In these network groups, employees are grouped with senior executive sponsors and executive level leaders to intentionally foster relationships within the company. Each network group defines a charter that outlines the specific mission of the group, sets cadence for connecting and provides guidelines for participation. And Xylem Employee Network groups connect collectively globally via internal social media platforms and are augmented with local/site network group chapters.

Challenges

As Xylem evolves their Employee Network Groups, they are focused on solving challenges such as:

- Global relevance: ensuring Xylem Employee Network groups are relevant for global colleagues
- Chapter development: encouraging business locations to create site level Employee Network Group "chapters" to grow the network and create opportunity for colleagues to connect and engage locally
- *Including "non-wired" colleagues:* ensuring non-wired or "deskless" employees are aware of and have the opportunity to participate in the groups

Lessons Learned

As Xylem evolves their Employee Network Groups, Xylem has learned

Formal leadership support and engagement is critical to the success of Employee Network Groups

Allies play an important role in Employee Network Groups by advocating for a fair and just experience for the employees who share a common identity with the group and learning how to support the group

Highlights

Noteworthy aspects of Xylem Employee Network Groups include:

- Each Network Group has a formal leadership structure, including a senior executive sponsor and executive level leaders
- Each Network Group has a defined charter that sets mission, focus and goals
- A global Network Group connects via internal social media platform augmented with local/site network group chapters
- Xylem has grown the employee network groups from 2 to 6 in two years (see graphic below)



- Xylem Employee Network Groups connect to celebrate diversity holidays such as: International Women's Day, Veteran Days, Pride Month, etc.
- Xylem Employee Network Groups have positively influenced external accolades for example, increasing our score to 100% on Human Rights Campaign Corporate Equality Index
- Xylem is leveraging Employee Network Groups for outreach and connection during COVID-19 for example, the Xylem Women's Network conducted global listening sessions with women to understand how they are coping with disruption due to covid-19
- Xylem's internal social media platform, called "XylemNow" is an excellent platform for Employee Network Groups to connect and collaborate globally
- Xylem's employee engagement survey results show increasing scores for inclusive culture, which (at least in part) can be attributed to Employee Network Groups

CASE STUDY 4: MUNICIPALITY (Metropolitan Water Reclamation District of Greater Chicago

Introduction

The mission of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) is to protect the health and safety of the public in its service area, protect the quality of the water supply source (Lake Michigan), improve the quality of water in watercourses in its service area, protect businesses and homes from flood damages and manage water as a vital resource for its service area. The MWRDGC's service area is 882.1 square miles of Cook County, Illinois. The MWRDGC serves an equivalent population of 10.35 million people; 5.25 million real people, a commercial and industrial equivalent of 4.5 million people, and a combined sewer overflow equivalent of 0.6 million people. The MWRDGC operates seven water reclamation plants, with a staff of 1,800 employees and an annual budget over \$1.1 billion.

Approach

The MWRDGC incorporates Diversity and Inclusion throughout the organization and the community it serves. Diversity is included in MWRDGC's core value of Respect. To meet its goals, MWRDGC depends on the integrity, knowledge, skill, diversity, and teamwork of its employees across Human Resources, Procurement, Public Affairs, and Engineering.

Human Resources - Human Resources ensures that the MWRDGC plans for recruiting, hiring, and retaining the diverse talent needed to meet its organizational goals. The internship program continues to provide meaningful projects and educational training experiences for students interested in wastewater management and operations. Further, entry level engineers have the opportunity to participate in a mentorship program, which pairs them with seasoned engineers. The District's minority workforce representation, as of September 30, 2019, was 43 percent, which compares favorably with the Cook County minority labor force availability rate of 36 percent. The District's female workforce representation, as of September 30, 2019, was 26 percent, compared to the Cook County female labor force availability rate of 41 percent, when adjusted for MWRDGC-specific occupations. The MWRDGC continues to target its recruitment efforts on increasing underrepresented minority and female representation in specific job categories.

Procurement - The MWRDGC ensures that minority owned (MBE), women owned (WBE), small (SBE), and veteran owned (VBE) business enterprises are given equal opportunities to participate in the performance of the District's construction program and professional service contracts in excess of \$100,000, by establishing participation goals as part of the contracts. The MWRDGC participates in outreach activities, including trade shows, conferences, and contractor training sessions covering District business practices. These activities directly impact the development of MBE, WBE, SBE, and VBE vendors and the community at large.

Public Affairs – In 2019, the MWRDGC hosted 188 tours/open houses with over 4,800 visitors, attended over 140 outreach events impacting more than 117,000 people, and visited over 120 schools and other organizations to educate more than 9,000 people in every part of MWRDGC's service area. The MWRDGC works with subject matter experts to develop materials that educate the public on how to manage stormwater and prevent water pollution and publishes material in both English and Spanish. Each year the MWRDGC hosts an African American celebration and Women's History Celebration highlighting the contributions of MWRDGC staff and community leaders in the service area. MWRDGC staff promote STEM initiatives in grade schools through participation in the Future Cities and MathCounts competitions and industry related organizations. Additionally, MWRDG staff participate as mentors in the Working in the Schools (WITS) program. The WITS program sets students from economically disadvantaged communities on a trajectory for success by building critical literacy skills and developing positive self-identity through teacher led literacy professional development and volunteer powered mentorship programs. Building relationships between corporations and neighborhood schools directly serves their mission.

Engineering – The MWRDGC continues to partner with Chicago Public Schools, the Chicago Department of Water Management, Healthy Schools Campaign, and Openlands on the Space to Grow Program implementing Green Infrastructure into schoolyards and creating vibrant places for students to play and learn.

Challenges

Site specific challenge: The Village of Robbins is a historic African-American community located in southern Cook County, Illinois. Like many communities in the Chicagoland area, there is a need for investment and revitalization. With over 300 acres of vacant land, residents need to travel out of town for day-to-day services. In addition, the community suffers from stormwater flooding due to nearby Midlothian creek, which affects over 100 homes in the village. The MWRDGC partnered with Robbins to develop an infrastructure investment project, which centers on the creation of a stormwater park to alleviate flooding issues in the village.

Although some activities mentioned above are not intentionally Diversity and Inclusion initiatives, the MWRDGC continues to strive to incorporate the initiatives into existing programs. The MWRDGC is continually looking at efforts to combat systematic bias in the institution and the community.

As a governmental entity, the MWRDGC has a set salary schedule for pay plans and grades attached to job classifications. In an effort to attract diverse talent, the MWRDGC is limited by the salary schedule and may not be able to compete with counter offers from other employers seeking to attract and hire the same individual.

In summary, both internally and within the community it serves, the MWRDGC strives to ensure Diversity and Inclusion in its staffing, community engagement, contract opportunities and relationship building.

References

Brookings Institute. (2016). Annual Report. https://www.brookings.edu/wp-content/uploads/2016/12/2016-annual-report.pdf Date Accessed: July 16, 2020

Bethany Wilkinson. (2019, June 23). The Diversity Gap [Audio Podcast].

Brown, V.A., Harris, J.A., Russell, J.Y. (2010). Tackling wicked problems: through the transdisciplinary imagination. Earthscan, London.

Doney, S.C., Ruckelshaus, M., Duffy, J.E., Barry, J.P., Chan, F., English, C.A., Galindo, H.M., Grebmeier, J.M., Hollowed, A.B., Knowlton, N., Polovina, J., Rabalais, N.N., Sydeman, W.J., Talley L.D. (2012). Climate Change impacts on marine Ecosystems. Annual Review of Marine Science, 4, 11-37.

FAO, IFAD and WFP. (2015). The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. FAO, Rome.

Giakoumi, S., Halpern, B.S., Michel, L.N., Gobert, S., Sini, M., Boudouresque, C., Gambi, M, Katsanevakis, S., Lejeune, P., Montefalcone, M., Pergent-Martini, C., Sanchez-Jerez, P., Velimirov, B., Vizzini, S., Abadie, A., Coll, M., Guidetti, P., Micheli, F., Possingham, H.P. (2014). Towards a framework for assessment and management of cumulative human impacts on marine food webs. Conservation Biology, 1-7.

Halpern, B. S., Selkoe, K. A., Micheli, F., Kappel, C. V. (2007). Evaluating and ranking the vulnerability of global marine ecosystems to anthropogenic threats. Conservation Biology, 21,1301–1315.

Heisler, J. Glibert, P.M., Burkholder, J.M., Anderson, D.M., Cochlan, W., Dennison, W.C., Dortch, Q., Gobler, C.J., Heil, C.A., Humphries, E., Lewitus, A., Magnien, R., Marshall, H.G., Sellner, K., Stockwell, D.A., Stoecker, D.K., Suddleson. M. (2008). Eutrophication and harmful algal blooms: a scientific consensus. Harmful Algae, 8, 3-13.

Howarth, R.W. (2008). Coastal nitrogen pollution: A review of sources and trends globally and regionally. Harmful Algae, 8, 14-20.

Howarth, R., Chan, F., Conley, D.J., Garnier, J., Doney, S.C., Marino, R., Billen, G. (2011). Coupled biogeochemical cycles: Eutrophication and hypoxia in temperate estuaries and coastal marine ecosystems. Frontiers in Ecology and the Environment, 9(1): 18–26.

National Institutes of Health. (2006). NIH roadmap for medical research. Bethesda, MD.

National Science Foundation. (2011). Empowering the nation through discovery and innovation— NSF strategic plan for fiscal years (FY) 2011–2016. Arlington, VA.

National Science Foundation. (2014). Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014 – 2018. No NSF14043. Arlington, VA.

Strong Coasts (2019) Strong Coasts: A collaborative National Research Traineeship. http://www.strongcoasts.org/wp-content/uploads/2020/06/Bios-NSF-2019-Strong-Coasts-Foodenergy-water-field-course-4.pdf accessed 7/13/20.

Woodland, R.J., Thomson, J.R., MacNally, R., Reich, P., Evrard, V., Wary, F.Y.; Walker, J.P., Cook, P.L.M. (2015). Nitrogen loads explain primary productivity in estuaries at the ecosystem scale. Limnology and Oceanography, 60(5), 1751–1762.

United Nations. (2017). Percentage of Populations Living in Coastal Areas. Available at: http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/oceans_seas_coasts/pop_coastal_areas.pdf

Woodland, R.J., Thomson, J.R., MacNally, R., Reich, P., Evrard, V., Wary, F.Y.; Walker, J.P., Cook, P.L.M. (2015). Nitrogen loads explain primary productivity in estuaries at the ecosystem scale. Limnology and Oceanography, 60(5), 1751–1762.